Eno
Center for
Transportation

TOWARD UNIVERSAL ACCESS

A CASE STUDY IN THE LOS ANGELES AND PUGET SOUND REGIONS

Toward Universal Access:

A Case Study in the Los Angeles and Puget Sound Regions

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About the Eno Center for Transportation

The Eno Center for Transportation is an independent, nonpartisan think tank whose vision is for an American transportation system that fosters economic vitality, advances social equity, and improves the quality of life for all. The mission of Eno is to shape public debate on critical multimodal transportation issues and build an innovative network of transportation professionals. As an organization, Eno values integrity, independence, objectivity, quality, and relevance. These core values are reflected in everything we do.

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About the Federal Mobility on Demand Project

Mobility on demand (MOD) refers to transportation services that can be hailed in real-time for an impending trip. MOD integrates data such as location tracking and traffic conditions with user-entered destination and payment information. Though most MOD services are designed for users to interface using a smartphone, MOD can be requested through a web browser or call center, which can increase accessibility and equity of the service for people without access to a smartphone, people with vision impairments, people who require non-English communication, and others. While MOD is not a new concept, recent technological advancements facilitate its deployment in a new way. Its role in the future of transit systems is yet to be determined.

In May 2016, the Federal Transit Administration (FTA) announced $8 million in funding for its Mobility on Demand Sandbox Demonstration Program. The program is part of FTA's support of transit agencies, government entities, educational institutions, and communities as they experiment with on-demand mobility tools such as smart phone applications and shared mobility services to augment and enhance existing transit agency services. MOD Sandbox was developed to test new ways to encourage multimodal, integrated, automated, accessible, and connected transportation. Among the key features of the program is its focus on local partnerships and demonstrated solutions in real-world settings.

Some of the eligible activities applicants could propose to advance MOD and transit integration were new business models for planning and development, the acquisition of new equipment, services, software and hardware, and operation of the project in a real-world setting. Eligible partners included public transportation providers, state and local departments of transportation, federally recognized Indian tribes, private for- and not-for-profit organizations, transportation service operators, state or local government entities, consultants, research institutions and consortia, and not-for-profit industry organizations. In October 2016, 11 projects were selected for funding (see Appendix.)

The largest project awarded was a two-region partnership between Los Angeles and the Puget Sound Region. The Los Angeles County Metropolitan Transportation Authority (LA Metro) collaborated with King County, Washington Metro Transit (King County Metro) and the Central Puget Sound Regional Transit Authority (Sound Transit) on a project to contract with a transportation network company (TNC) to provide first/last mile service to select transit stations near disadvantaged communities. This proposal included evaluation and reporting by the Eno Center for Transportation and local research universities. The FTA awarded the team a grant of $1.35 million for the pilot and corresponding research.

The stated overall goal of the Los Angeles/Puget Sound project is to: 1) define how TNC services can be aligned with existing transit service to serve an effective first-mile/last-mile solution; 2) define how key partners can cost-effectively ensure equal access for individuals with disabilities and low incomes; 3) demonstrate payment integration across transit operator and TNC platforms, specifically to enable service to lower income and unbanked populations.

1. Introduction

Approximately 61 million U.S. adults—one quarter of the adult population—live with some form of disability.[1] The Americans with Disabilities Act (ADA) and other laws, regulations, and guidance aim to protect the rights of people with disabilities, prohibit discrimination based on disability, and provide equal access to opportunity. As a civil rights law that applies to both public and private transportation providers, the ADA aims to ensure equal access to mobility for disabled persons.

Although each disability is unique, and many are unaccounted for or underreported in various contexts, one of the most common forms of functional disability is mobility impairment (e.g., difficulty walking or climbing stairs), which affects approximately 13.7 percent of adults in the United States.[2] Disabilities are particularly common in certain demographic groups, including adults over 65, women, and non-Hispanic American Indians and Alaskan Natives, with at least 20 percent of each of these groups experiencing some form of disability.[3]

The requirements of the ADA apply to all transportation services whether or not they receive federal funding.[4] But they do vary depending on what transportation mode(s) are involved, whether or not paratransit is available in the service area, and other specificities of the program. Like all transportation programs, the Federal Transit Administration's (FTA) MOD Sandbox programs must adhere to the ADA. But the case studies described in this report are pilot projects, and therefore are not required to comply with all regulations that typically govern regular, long-term public transit service.[5] The MOD services in the Los Angeles and Puget Sound regions operate in areas that are also served by paratransit, which legally covers the ADA requirement for complementary paratransit when fixed route service is provided. But the existing paratransit does not provide the same level of on-demand access, and a goal of the pilot in both regions is to provide equitable service to all users.[6]

2. Background

2.1 National laws and regulations

Federal civil rights law prohibits entities from discriminating against persons with disabilities under the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973, as amended.[7] Under these regulations, persons with disabilities must be provided with equal opportunity in employment, state and local government services, public accommodations, commercial facilities, and transportation.

The ADA also regulates the operation of transit service, including ensuring appropriate passenger assistance and customer service; providing rider information through accessible formats and technology; and ensuring the accessibility of public

meetings, websites, and other outreach.[i] The pilot projects described in this report, while focused primarily on improving physical access to MOD services, highlight the importance of conducting outreach with the target service population to ensure that the needs of people with a wider range of disabilities can be addressed.

Titles II and III of the ADA constitute the basis for the accessibility guidelines developed and maintained by the United States Access Board. These ADA Accessibility Guidelines include scoping and technical requirements for the accessibility of buildings, facilities, and vehicles used to provide public transportation services, among other requirements, and comprise the basis for legal standards enforced by the U.S. Departments of Justice (USDOJ) and Transportation (USDOT).[8] USDOT's implementing regulations outline specific requirements for transit providers to ensure the accessibility and usability of their transportation services, vehicles, and facilities by persons with disabilities.[9] This guidance provides the basis for enforcing measures of inclusivity in the overall design and operation of transit systems so as to best serve a broad range of potential riders.

The law applies beyond public transit agencies. A private entity that provides services under a contract or other arrangement, such as a grant, with a public entity is considered to "stand in the shoes" of the public entity and is thereby subject to the same requirements of that entity under ADA Title II.[10] This means that private companies contracted to public agencies must also adhere to ADA requirements and provide accessible transportation services and vehicles.

This extension of responsibility is particularly important for providing equitable access to persons with disabilities as the private sector is playing an increasingly significant role in shaping accessibility and mobility options in partnership with public agencies. In 2016, when the MOD Sandbox grants were awarded, there were not yet models for transportation network companies (TNCs) to partner with public agencies and provide wheelchair-accessible vehicle (WAV) service. Testing some pilots under this model was one of the motivations for the FTA to set up the MOD Sandbox program.

The FTA assists both private and public recipients of FTA funding with guidance for implementing ADA-compliant service in the form of an FTA circular.[11] The circular addresses requirements specific to a range of transit service types, including fixed-route bus; complementary paratransit; demand responsive transit

[i] The ADA, which applies to federal contractors and programs receiving federal funds, addresses the provision of public transportation services by public entities under Title II and by private companies under Title III. Public sector transportation services operated by state and local governments include bus and rail systems, while private companies provide a range of complementary services, including taxicabs, airport shuttles, intercity bus companies, and hotel shuttles.

(such as paratransit and MOD options); rapid, light, and commuter rail; and passenger ferries.

The FTA encourages, but does not require, agencies to reach out to riders with disabilities as an important part of any transit service decision making process. This outreach can help agencies identify areas where they need to coordinate with other departments or offices, and it can help them better understand how to improve service beyond following the letter of the law. The agencies participating in the MOD Sandbox pilot projects conducted outreach activities with target riders, which included focus groups, direct phone calls, targeted fliers, and meetings with specific stakeholder groups. The lead agencies in both the Los Angeles and Puget Sound regions conducted outreach activities throughout the project planning and implementation process.

2.1.1 Accessibility requirements that apply to all public transit services

Vehicles and infrastructure associated with public transit must be accessible according to the specifications of the ADA. Transit agencies must make use of accessibility-related equipment and features in order to provide accessible service to riders with disabilities, including those who use wheelchairs and other mobility aids. Accessibility features must be satisfactorily maintained and remain free from obstruction. Examples of accessibility features for vehicles include lifts, ramps, lighting, and public address systems; examples for facilities include elevators, handrails, pathways, and signage. Sometimes this requirement spurs complicated multi-jurisdictional challenges, such as the need for cities to provide curb ramps and sidewalks that meet wheelchair accessibility standards at transit agency bus stops.

Physical assets are only one element of accessibility. Service personnel must be trained to meet ADA requirements to consistently and reliably operate accessibility features while providing appropriate and respectful assistance.[12] Although important, the minimal nature of this requirement allows both public and private transportation providers to meet its intent in a wide range of ways—there is no standardized accessibility training for operators. Additionally, riders with disabilities must be permitted to bring service animals and portable oxygen supplies onto transit, a policy that has already been adopted by all transit agencies and private mobility companies involved in this project but that, generally speaking, is not always implemented in practice.[13]

2.1.2 Accessibility requirements for public transit vehicles

When first passed in 1990, the ADA enacted a phased approach to transition public transportation fleets to become fully accessible, meaning that all vehicles providing transit service should eventually be "readily accessible to and usable by individuals with disabilities."[14] Now, new services and vehicles must be accessible from the beginning. Requirements for vehicle acquisition (by purchase, lease, or donation) of

public transit providers depend on service type (e.g., fixed route bus, demand responsive), vehicle type (e.g., rail or non-rail, such as buses/vans), and vehicle condition (e.g., new, used, or remanufactured).

If a transit agency works with a private contractor to provide transportation services, it must ensure that the contractors comply with DOT ADA regulations regarding both service vehicle acquisition as described above and service delivery (per the "stand in the shoes" provisions described in Section 2.1). When contracting with a private entity to provide public transit service, agencies must maintain or increase the percentage of their demand-responsive fleet that is accessible to riders with disabilities. Vehicles provided by the contractor cannot diminish the overall percentage of accessible vehicles within the agency's fleet.

2.1.2.1 Standards for accessible buses and vans

Requirements specific to buses and vans specify accessibility features such as lifts, ramps, wheelchair securements, and priority seating.[15] The vehicles used as WAVs in the Los Angeles and Puget Sound MOD Sandbox pilot are classified as vans. Regulated vehicular elements include design load, controls, platform features, handrails, and emergency operation systems. Specifications relevant to bus or van ramps include standards for design load, ramp surface, attachment, and stowage.[16]

All ADA-compliant vehicles must be equipped with a system to secure wheelchairs and mobility aids as well as provide a seat belt and shoulder harness for wheelchair users.[17] Because design and configuration of wheelchair securement systems vary widely across vehicles, they are regulated through performance standards. These standards address design load, location and size of the securement system, orientation, and seatbelt/shoulder harness, among other considerations.[18] The FTA recommends that service providers select a securement system with the ability to accommodate the widest possible range of mobility devices, including oversized wheelchairs and scooters. Operators are also required to ensure that personnel are "trained to proficiency" regarding both safety standards and their capacity to assist individuals with disabilities in a respectful and courteous manner.[19]

2.1.2.2 Standards for demand-responsive service

Demand responsive transportation systems comprise any system that does not operate on a fixed route, including services provided by both public and private entities. Demand responsive systems include dial-a-ride service, taxi subsidy service, vanpool service, route deviation service, and complementary paratransit service. Agencies may purchase non-accessible vehicles for a demand responsive service that serves the general public only if the transit system as a whole provides "equivalent service" to individuals with disabilities, including wheelchair users.[20] Equivalent service is evaluated in terms of the following characteristics:

- Response time
- Fares

- Geographic service area
- Hours and days of service
- Restrictions or priorities based on trip purpose
- Availability of information and reservation capability
- Any constraints on capacity or service availability

Transit agencies are required to monitor demand responsive services to ensure they are compliant with ADA requirements. The FTA does not specify how demand responsive services are monitored, leaving agencies to decide on appropriate methods based on the characteristics of the services they offer.[21]

2.1.3 Accessibility requirements for public transit facilities

Like vehicles, public transit facilities must also adhere to accessibility requirements. Passengers with disabilities need to be able to easily access pickup and drop-off (PUDO) locations and require adequate room for boarding and alighting vehicles. Examples of considerations include slope requirements, curb ramps, and accessible paths of travel.

For regulatory purposes, facilities are defined as "all or any portion of buildings, structures, sites, complexes, equipment, roads, walks, passageways, parking lots, or other real or personal property, including the site where the building, property, structure, or equipment is located."[22] Transit facilities required to meet ADA regulations include train stations as well as bus and BRT stops.

USDOT sets the regulatory standards for ADA compliance, requiring that entities must "operate their transportation facilities in a manner that, when viewed in their entirety, are accessible to and usable by individuals with disabilities."[23] When transportation facilities are used by multiple agencies, all entities involved are encouraged to coordinate closely during the process of facility design, construction, or alteration to ensure maximum accessibility for users of all services.

2.1.3.1 Bus stops

Although existing regulations do not specifically describe requirements for curbside pickup facilities, many of the considerations for the accessibility of bus stops can be applied to MOD service, as both involve staging and boarding at the curb.

Where feasible, bus stops must be sited at locations that will permit construction of an accessible boarding and alighting area that complies with requirements for surface, dimensions, connections, and slope.[24] Such accessibility entails placement of the stop on a firm, stable surface with adequate clear area; connection via an accessible route to streets, sidewalks, or pedestrian paths; and meeting maximum slope requirements.[25] Although transit agencies often do not have control over pedestrian rights-of-way adjacent to bus stops, accessible pathways are needed to

enable riders with disabilities to reach the bus stop and properly access vehicles with accessibility features such as lifts. [26]

Complementary paratransit can provide a potential alternative means of service where a stop is inaccessible; however, transit providers are encouraged to coordinate with local municipalities to ensure accessible connections to all bus stops. One advantage of MOD and paratransit services is that specific pickup locations can be requested, and adjusted if necessary, to better align with curb ramps or to avoid sidewalk obstructions. This flexibility still relies upon the general accessibility of the built environment surrounding the pickup and drop-off locations, highlighting the critical nature of adherence to ADA regulations for sidewalks as part of enabling accessible MOD services.

2.1.4 Accessibility requirements for private mobility companies and TNCs

New mobility options have created opportunities for partnerships between transit providers and TNCs that have the potential to provide improved service for people with disabilities and more efficient use of agency resources. Research has demonstrated that more travel options and the use of shared modes promote public transit use, reduce car ownership, and decrease spending on transportation.[27] Partnerships between transit agencies and TNCs also have the potential to reduce paratransit costs, as noted both in the literature and by the transit agencies involved in the MOD Sandbox pilot.[28]

However, meeting ADA requirements in such partnerships must be addressed. A New York Public Transit Association study on issues arising during coordination between transit systems and TNCs identified compliance with federal and state laws, including federal ADA requirements, as a potential barrier to coordination.[29] Additional potential barriers include ADA-related workforce training , technology compatibility for trip planning and booking, data sharing between agencies and companies, cell/wi-fi service in rural areas, and smart phone ownership/use.[30] The disability community has also voiced concerns about the inability of some customers to access apps (and therefore smartphones and credit cards) that provide the basis for most TNC services due to the nature of their disability or limited English proficiency.[31]

In the cases where TNCs are providers of on-demand public transportation, TNCs must comply with Title II regulations even as private entities because they "stand in the shoes" of the public transit agencies.[32] The FTA has emphasized the importance of ensuring equitable access in services provided through partnerships between transit agencies and TNCs as well as the need to adhere to ADA regulations regardless of funding source.[33] Although ADA requirement waivers have been requested within the context of some MOD Sandbox Program pilots, the FTA has yet to grant any exceptions.[34]

TNCs providing on-demand service on behalf of a transit agency must meet equivalency standards for ADA service in terms of response time, fares, geographic area of service, service hours, restrictions or priorities based on trip purpose, availability of information and reservations capability, and any constraints on capacity or service availability.[35] Vehicles provided by either the TNC, a driver, the agency, or another operator (e.g., a taxi service) can be used to meet this requirement. Service must be provided in the most integrated setting, meaning that there cannot be separate services used by groups with different levels of ability or disability.[36]

Meeting equivalency standards for individuals using wheelchairs has proven to be challenging for TNCs when they are not partnered with transit agencies who use paratransit as the legal equivalency provision.[ii][37] Measurement of TNC service provided (both wheelchair-accessible and non-WAV) is needed in order to fully understand whether equivalent service is being provided and could help to establish the basis for future regulatory measures for transit/TNC partnerships.[38]

The ability of TNCs to adhere to local, state, and federal accessibility regulations is critical to establishing a successful partnership.[iii][39] Pilot projects enable transit agencies and TNCs to figure out how to provide accessible services, including considerations for communications, information/data sharing, and technology (e.g., payment systems). Requirements for the jurisdictions involved in the pilot projects described by this report are covered in the following sections.

2.2 State and local regulations

State or local laws can override the ADA if they provide more protection for or greater benefit to individuals with disabilities.[40] In both Washington State and California, the state-level DOTs cite Title II of the ADA and Section 504 of the Rehabilitation Act of 1973 (which precedes the ADA in prohibiting discrimination on the basis of disability) as providing the basis for protection against non-discrimination in the provision of transportation services. The Washington State DOT has developed a field guide, which reflects the U.S. Access Board's Public Right of Way Accessible Guidelines (PROWAG) as a reference for the evaluation of accessible pedestrian features located within public rights of way.[41] Likewise, CalTrans, California's DOT, publishes a Permanent Pedestrian Facilities ADA Compliance Handbook that outlines requirements for transit-relevant ROW elements like pathways, curb ramps, and accessible paths of travel.[42]

[ii] Specifically, in terms of meeting requirements for vehicle types, response time, and availability of service.

[iii] As evidenced by the failure of Lyft and LA Metro to come to an agreement regarding compliance with regulations ensuring accessible service early in multiple MOD Sandbox pilots.

2.2.1 Washington State and Seattle

In Washington State, equal access to government buildings and services is protected by both the ADA and the Washington Law Against Discrimination (WLAD). The WLAD defines disability more broadly than does the ADA and provides for more extensive protection of civil rights for those with disabilities, including the "full enjoyment of any of the accommodations, advantages, facilities, or privileges of any place of public resort, accommodation, assemblage, or amusement."[43]

In alignment with ADA Title II and the WLAD, King County Code protects against discrimination in places of public accommodation, including those operated by transit carriers.[44] In compliance with the ADA, Sound Transit, the Puget Sound's regional transit agency, provides complementary paratransit that parallels its Link light rail and Tacoma Link services in terms of both geography and hours of service. Paratransit service is contracted with county-level transit agencies King County Metro and Pierce Transit, which operate paratransit services in their respective coverage areas.[45] King County Metro and Sound Transit, which operate accessible fixed-route bus and commuter rail services, respectively, also partner to offer a Regional Reduced Fare Permit program for seniors (65+), individuals with disabilities, and Medicare card holders.[46]

The city of Seattle also adheres to Title II of the ADA to provide accessible programs, services, and facilities. Guidelines based on the ADA are used in combination with the city's Pedestrian Master Plan to guide the prioritization of accessibility improvements.[47] The Seattle Department of Transportation (SDOT) provides an Accessible Route Planner and accommodates requests for accessibility improvements such as curb ramps, accessible pedestrian signals, sidewalk repairs, and new technology evaluations as feasible. SDOT's additional accessibility and ADA compliance efforts include community outreach through its Safe Routes to School program, its Neighborhood Park and Street Fund improvement program, and other initiatives aimed at increasing access and inclusion within the right-of-way.

As far as other regulations for TNCs, Washington State regulates TNCs only with regard to insurance and driver's license requirements.[48] The state gives cities, counties and port districts the ability to regulate for-hire vehicles operating within their respective jurisdictions.[49] It also enables jurisdictions to enter into cooperative agreements for the joint regulation of for-hire vehicles.[50] King County and Seattle have such an interlocal agreement, in which King County manages all for-hire drivers licensing functions for both jurisdictions while the Seattle manages all for-hire vehicle licensing functions for both jurisdictions.[51]

Although TNC regulations vary slightly between the jurisdictions, they are consistent with regard to considerations for accessible service. Per King County and Seattle regulations, TNCs must:[52]

- Allow passengers to indicate whether they require a WAV and provide connection to those services via a weblink, app, or phone number.
- Maintain accurate and complete operational records for two years, including number of requested rides for an accessible vehicle.

TNCs drivers who operate wheelchair accessible vehicles must:

- Successfully complete a training program for the special needs of passengers in wheelchairs, including, but not limited to, loading and tie-down procedures and door-to-door service.
- Provide services to passengers in wheelchairs before any other services.
- *Not* refuse to transport a wheelchair that can be folded and placed in the service vehicle's passenger, driver, or trunk compartment or a service animal used to assist persons with disabilities.

TNCs must pay a fee of $0.23 per-trip fee for all trips originating outside of Seattle and an $0.08 per-trip fee for all trips originating within the city to cover the costs of TNC regulation and enforcement.[53] In addition, they must pay a $0.10 per-trip fee to the Wheelchair Accessible Services (WAS) Fund, which is collected by each jurisdiction based on trip origin.

The WAS fund is used to offset the higher costs of providing wheelchair accessible services, including vehicle purchase and retrofitting costs, fuel and maintenance costs, and time incurred while providing wheelchair accessible trips. Seattle's Department of Transportation works with the Seattle Commission for People with Disabilities on regulations for determining the need for additional wheelchair accessible for-hire vehicles and use of the WAS fund for vehicle retrofits.

2.2.2 California and Los Angeles County

Los Angeles County operates in accordance with Title II of the ADA as well as with its Board Policy on non-discrimination, which recognizes the county's Chief Executive Office as the enforcement authority for Title II as it pertains to county services, programs, and activities.[54] LA Metro supports a range of transportation services that accommodate individuals with disabilities, including accessible bus service and Access Services, an ADA-compliant paratransit provider serving people in Los Angeles County who are unable to use fixed-route transportation systems.[55] Cityride, a transportation assistance program operated by Los Angeles Department of Transportation (LADOT), also provides service for qualified disabled persons and individuals over 65 within the City of Los Angeles and in some areas of Los Angeles County.[56] There are also numerous other municipal dial-a-rides that provide services to people with disabilities throughout Los Angeles County. LA Metro also

operates a reduced fare program for seniors (62+), individuals with disabilities, K-12 students, and college/vocational students.[57]

Statewide policy in California regarding TNCs is managed by the California Public Utilities Commission (CPUC). The TNC Access for All Act, which was signed into California state law in September of 2018, requires the CPUC to include "a program relating to accessibility for persons with disabilities" in its regulatory oversight of TNCs.[58] The bill aims to increase on-demand mobility access for the disability community by requiring TNCs to provide accessible services for people with disabilities, including those requiring WAVs, through their app-based platforms. Key rules and regulations regarding disability and vehicle accessibility from the initial phases of implementation include the following:

- TNCs must allow passengers to indicate whether they require a wheelchair-accessible vehicle or a vehicle otherwise accessible to individuals with disabilities.
- TNCs are required to provide an annual report to the CPUC Safety and Enforcement Division that includes data on the number and percentage of customers who requested accessible vehicles as well as how often the TNC was able to comply with those requests.
- TNCs must supply the following documents: an accessibility plan (to be updated annually), a plan for "avoiding the divide between the able and disabled communities," and a report describing their driver training program.

The CPUC is currently in Phase III of a rulemaking process to further address the accessibility issues raised by the TNC Access for All Act, including consideration of requirements for accessible vehicles.[59] In June of 2019, it established the TNC Access for All Fund, which requires TNCs to charge customers a $0.10 per-trip "Access for All Fee." The resulting funds will be used to improve access to mobility services for riders with disabilities by helping to offset the higher cost of purchasing, operating, maintaining, and insuring WAVs.[60] Companies or other entities receiving offset fees must demonstrate the presence and availability of WAVs as well as improved response times through data reporting.

2.3 External Example: New York City

At the local level, New York City recently implemented driver caps and performance requirements for ride-hail companies with significant implications for WAV service. New York City has been viewed as a leader in its efforts to increase the supply and availability of WAV for-hire services, first through regulation of the taxicab industry, and more recently through the regulation of TNCs.[61]

In response to a class-action lawsuit claiming that New York's low percentage of accessible yellow cab taxis – less than 2 percent of the fleet at the time – was in violation of the ADA, the Taxi and Limousine Commission (TLC) passed a rule

instituting a Taxi Improvement Surcharge in 2014.[62] The 30-cent per-ride fee was added to all New York yellow cab fares to help subsidize the higher cost of owning and operating WAVs with the ongoing goal of making 50 percent of the fleet accessible. A similar surcharge was levied on fares for the city's street-hail livery (green cab) services to help support vehicle accessibility improvements. A portion of the surcharge is set aside to support wheelchair passenger assistance training, which is required of all taxi drivers applying for operating licenses after June 1, 2014.[63]

In addition to addressing the need for more accessible vehicles, a centralized dispatching mechanism is used to help support reasonable response times for WAVs. To help offset costs associated with potentially longer service times, drivers operating through the dispatch system receive additional payments if they wait more than ten minutes for a passenger with a wheelchair.[64]

In New York City, TNCs operate under the jurisdiction of the TLC. In August 2018, the TLC imposed a moratorium on new vehicle licenses for TNCs for one year in order to work towards addressing some of the issues related to expanding TNC services in the city, including increased congestion, the need for equitable driver wages, and a need to determine fair means for regulating the industry.[65] The cap does not apply to the addition of WAVs to TNC fleets.

In December 2018, the TLC adopted a rule requiring that TNCs provide "equivalent service" for all users, including those in wheelchairs. Equivalent service is evaluated in terms of: [66]

- Response time to requests for service
- Fares charged
- Hours and days of service availability
- Ability to accept reservations
- Restrictions based on trip purpose
- Vehicle types offered
- Other limitations on capacity or service availability

The rule also required that TNCs be prepared to dispatch 25 percent of their trips in WAVs by July 2023.[67] Claiming this requirement imposed an unreasonable financial cost, Uber, Lyft and Via together sued the TLC, citing the target percentage of WAV rides as arbitrary and not supported by rider demand.[68] As an alternative to meeting the 25 percent requirement, the TLC approved a performance measures-based approach, agreeing to a settlement allowing TNCs to instead to demonstrate their ability to respond to at least 80 percent of WAV requests in less than 10 minutes and 90 percent of WAV requests in less than fifteen minutes by 2021.[69]

Under the 2018 rule, TNCs are also required to provide detailed revenue and trip data on a monthly basis – for accessible vehicle trip requests only – under penalty of fine.[70] For these trips, data reporting must include:

- Dispatching base license number
- Date and time of request receipt
- Manner of request receipt (app, phone, etc.)
- Completed trip (yes or no)

For completed trips, additional reporting is required:

- Vehicle, base, and driver numbers
- Pick up and drop off locations
- Date and time of pick up arrival
- Total passenger wait time

Although making these data available can help to support the provision of more efficient and effective service for passengers requiring WAVs, TNCs are not required to share data for all trips, preventing a true comparison of equivalent service between WAV and non-WAV trip requests.[71]

3. Case Study: Los Angeles and Puget Sound Regions

While the ADA sets important standards and requirements in the transportation sector, it is also just one consideration in building a transportation network that is accessible for all users. The approaches taken in the Los Angeles and Puget Sound regions around planning, procurement, and operations can be compared and contrasted to help develop lessons learned for future programs in any region.

The transit agencies in Los Angeles and Puget Sound began project planning with their original MOD provider, Lyft, independently. They realized that Lyft would not be able to provide service for people with disabilities at the level the agencies expected. After leaving Lyft and bringing on Via as the MOD provider, the agencies in each region proceeded separately to find a method of accessible service provision that best matched the unique situations in each region. Despite different methods of implementation, both agencies set identical measures as key performance indicators with targets for Via to quantitatively assess service for people with physical disabilities. This section describes the MOD Sandbox pilot programs as implemented in both the Los Angeles and Puget Sound regions.

3.1 Los Angeles Region

When Via came on board as the MOD provider, LA Metro and Via signed a Term Sheet specifying not only that Via would provide WAV service, but also that it would provide Metro with specific data that would allow the agency to assess the equivalency of service for WAV and non-WAV users.[72] Given the uncertainty in demand and ridership, performance targets were established as adjustable, and a taxi company with WAV vehicles and trained drivers was retained as a contingency

service in the case WAV demand exceeded supply before Via had an opportunity to adjust. The taxi service was never used in the Los Angeles region, but a similar arrangement in the Puget Sound Region did prove necessary.

Early on in the planning process for the MOD pilot, LA Metro engaged Access Services, the LA County public entity that provides ADA paratransit in discussions about the pilot service. Though many transportation providers have a goal of increasing ridership, Access Services responded positively to the notion that Metro's partnership with Via could provide more affordable on-demand options to transport riders with disabilities to and from transit stations.

At the beginning of the project, Access Services staff volunteered time for discussions with Lyft regarding vehicle procurement. They later weighed in on vehicle procurement during discussions with Via, and played an invaluable role in reaching out to the disability community to inform them of the pilot program and collect feedback. Their insights also played a role in station and service area assessment by providing the LA Metro staff with aggregated ridership origin and destination data to identify opportunities for providing mobility for people with disabilities within the MOD service areas.

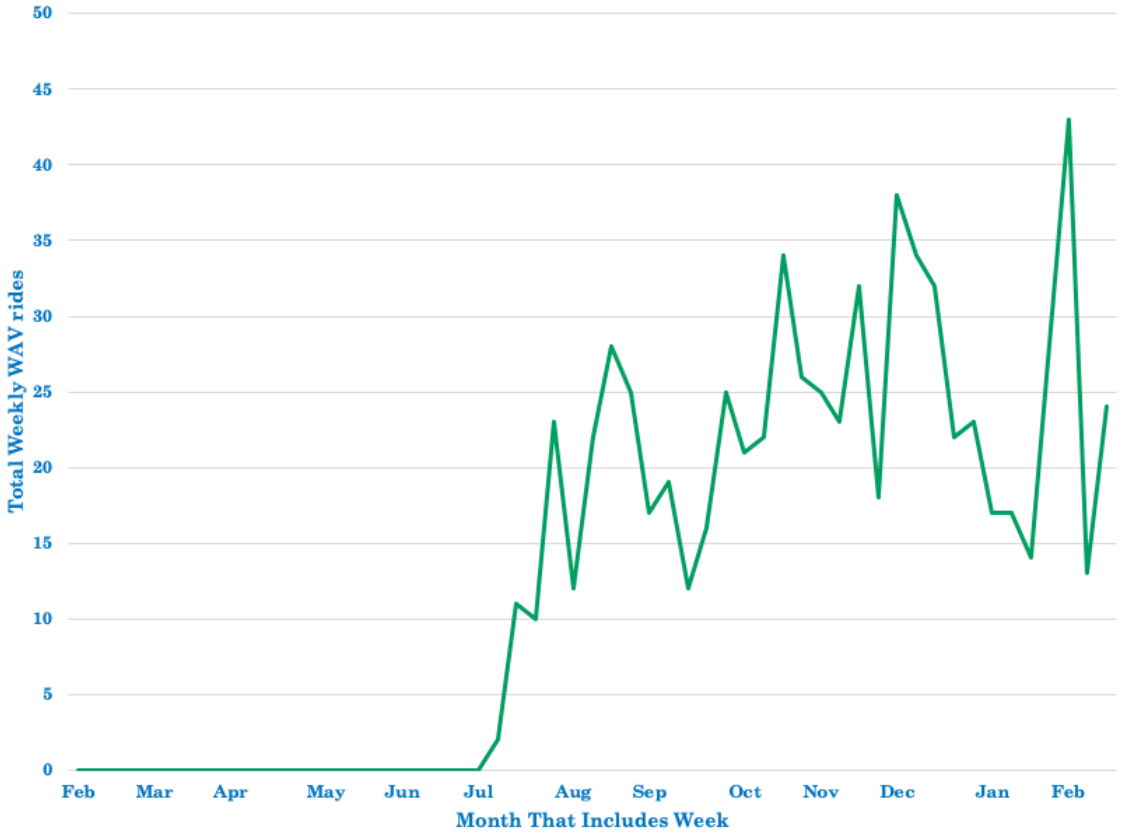
LA Metro's Office of Extraordinary Innovation (OEI) also collaborated internally with the agency's Civil Rights Department, Facilities Maintenance in the Operations Department, and Program Management to assess, adapt, and maintain PUDO zones at the stations included in the pilot project. In anticipation that the pilot would reduce some driving to the station and utilization of park and ride space, LA Metro converted a few park and ride spaces at the three initial pilot stations of El Monte, Artesia, and North Hollywood into both ambulatory PUDO spaces and ADA-compliant PUDO spaces. To keep the transformation temporary for the initially one-year-long pilot while also ensuring safety and accessibility and staying within budget, the agency utilized striping, signage, painted walkways, and plastic bollards. LA Metro also had to ensure that the slopes and widths of the pedestrian right-of-way complied with ADA standards. Once the pilot expanded to include more stations, the agency used existing PUDO zones at those stations for the pilot service.

As long as Via provided the service and shared data, LA Metro did not constrain Via as to whether to procure the vehicles and hire the drivers themselves, contract with a taxi or other service to provide vehicles and service, or devise a hybrid solution. In the end, Via connected their drivers with a third-party rental model for WAVs upon approval from LA Metro. The FTA provided limited legal guidance as to the vehicle procurement model. The vehicle procurement process included coordination between LA Metro's OEI and legal department, as well as Access Services.

As specified per the Term Sheet and contract, Via provided data for all requests and rides, including variables related to WAV requests and call center requests.[73] The research team also conducted multiple transit rider surveys, including a digital survey to all users through the Via app. The data from the first year of the pilot and the survey provide some additional insights regarding service performance for people requesting WAVs, though not for all people with disabilities.

In the Los Angeles region, the service received no requests for WAVs in the first four months of the pilot. Upon noticing the low utilization of WAVs, LA Metro and Via agreed to target outreach to the disability community to try to increase awareness and comfort with the program (methods described in more detail below). WAV requests and riders began to increase with outreach to Access Services riders in the service zones. In sum, riders requested 961 WAV trips in the first year of the pilot program (January 2019 to February 2020). Of these requests, 75.6 percent (n=728) were completed. Figure 1 shows the total number of completed WAV rides each week beginning in the month indicated on the X-axis.

Figure 1. Weekly Wheelchair Accessible Vehicle Rides Completed in the Los Angeles Region During the Pilot Project



Source: Data from the MOD Pilot

The estimated and actual wait times for WAV ride requests as compared to non-WAV ride requests is shown in Table 1.

Table 1. Estimated and Actual Wait Times for WAV and non-WAV requests

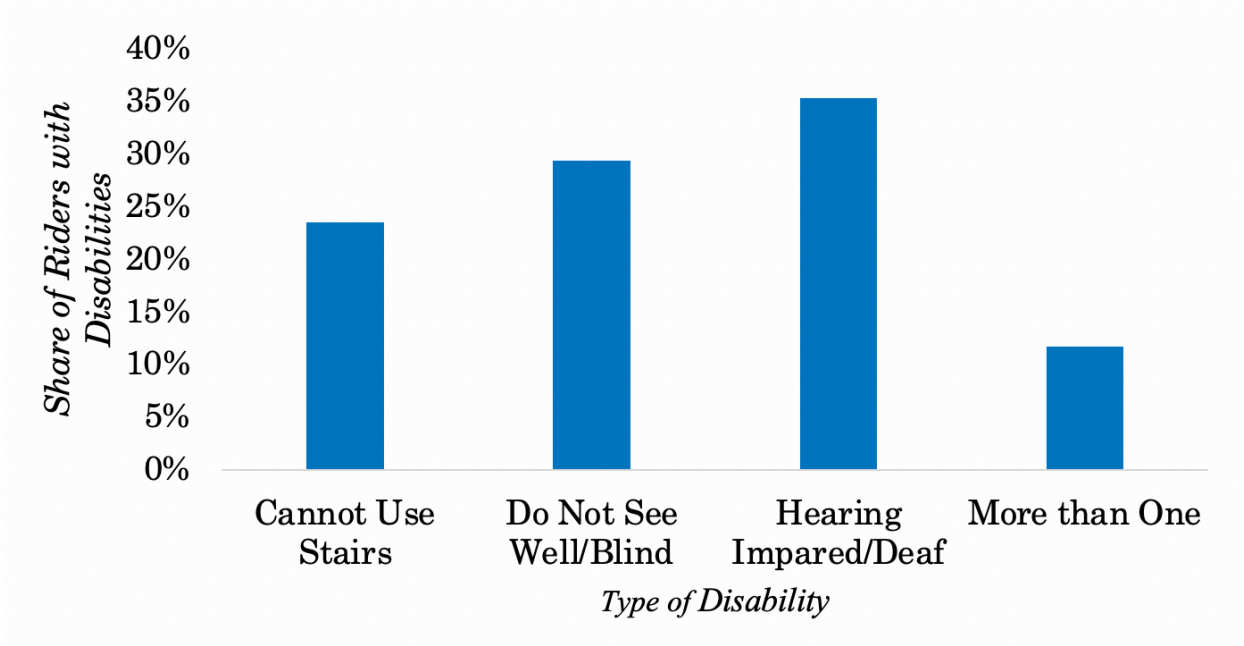
	Non-WAV	WAV
Mean estimated time to arrival	9.4 minutes	16.0 minutes
Standard deviation of estimated time to arrival	5.5 minutes	11.5 minutes
Minimum estimated time to arrival	0.2 minutes	0.9 minutes
Maximum estimated time to arrival	28.0 minutes	63.0 minutes
Mean actual wait time	9.0 minutes	13.7 minutes
Mean actual distance	2.5 miles	3.0 miles
Total number of requests	100,377	961
Total number of completed trips	79,010	728

Source: Data from the MOD Pilot

The means and distributions of the estimated and actual wait times show that WAV customers experience generally longer and less predictable wait times. The smaller number of WAVs available as compared to ambulatory vehicles available means that there is a higher probability that the WAVs could be further away from the requester, or already have a passenger and need to end a ride before picking up the next user. The number of requests does not align with the number of users, as many users are repeat customers. Overall, the 961 requests were made by 96 unique userIDs (presumably 96 unique users), with 26 people only requesting one ride, 44 users requesting between two and nine rides, and 26 people requesting 10 or more rides.

The research team deployed an online survey to Via pilot riders nine months after the pilot start. Of the 465 respondents, 17 (3.7 percent) respondents identified having some type of disability, as shown in Figure 2.

Figure 2. Disability Type Share of the Survey Respondents Who Identify as Having a Disability



n=17 Via survey respondents have a disability
Figure by Anne Brown
Data Source: Online Survey Deployed to Via Pilot Users

Regardless of the small sample size in the survey overall, the low raw number of responses from the disability community suggests a need for other types of outreach beyond digital surveys both for feedback and for service information. The share of users indicating vision and hearing disabilities suggests that more planning and evaluation of how those communities can and do use the service could have an impact on current users.

While users were not specifically asked if they might have otherwise utilized Access Services, later focus groups suggested that some Via pilot riders are also Access Services riders and may have shifted from Access Services to Via. Given that Access Services provided about 12,000 trips a day in 2019, the small WAV ridership makes it statistically impossible to measure mode shift related to this pilot.

Given the on-demand (rather than advance-scheduled) service and lower price of rides for the users (WAV rides were set at the same price as ambulatory vehicle rides of $1.75 for TAP card holders until Via made the service free early on, in the 11th week of service April 8, 2019), Metro's Partnership with Via seems to have better utility for riders than traditional paratransit.

Observing low levels of requests for WAVs in the first few months of the pilot, LA Metro worked with Access Services to send mailers their riders in the pilot service areas who also had used their TAP card in the past 60 days, indicating they were

able to use transit. LA Metro funded the materials, and Access Services provided the data, postage, and staff time to complete the task so as not to share their users' personally identifiable information. The mailers were also branded recognizably as materials from Access Services to create a sense of familiarity and to clearly show that the communication came from a trusted source. Access Services did receive feedback from some of their riders who used the Via service after learning about it. While the comments were minimal in number, all feedback was positive.

LA Metro also received feedback in the form of comments through the Via app. While sharing user comments recorded upon ride completion was not initially agreed upon in the data sharing agreement, LA Metro realized early on that monitoring the comments could help the agency learn about the user response to the pilot, and Via agreed to share the data field. For the most part, comments from WAV users praised the service and the drivers.

3.2 Puget Sound Region

Since improving access to transit for people with disabilities was one of the specific goals of the pilot for Sound Transit and King County Metro, they insisted on access for people with disabilities to be an integral focus of the MOD provider, which they eventually found through Via. Via allowed users to indicate a request for mobility assistance by toggling a button in their account in the app, or requesting it over the phone. These users would then be provided with a WAV if requested, and a pick-up or drop-off at an exact location, compared to other users who may have to walk a short distance.

Two of the specific, and related, goals of the public transit agencies in Puget Sound were to improve access to Link light rail and buses for persons with disabilities and to increase the use of Link and buses by persons with disabilities. All five of the stations served by Via to Transit connect to Link Light Rail and buses.

The transit agencies decided early on that they would not merely consider the available paratransit service as an adequate supplement for the Via to Transit MOD, even though that option would legally be considered compliant with the ADA. This meant ensuring that a portion of the fleet of vehicles used for the pilot would comprise accessible vehicles. Unlike the model in Los Angeles, where some MOD drivers use their own vehicles, the Puget Sound agencies provided a dedicated fleet of vehicles for the Via to Transit pilot, as decided upon by the transit agencies and Via, largely to uncomplicate fare integration goals and processes.[74]

The dedicated fleet consists of 18 vehicles, three of which were retrofitted as WAVs. The ambulatory vehicles have the capacity to hold six (but Via limits operational capacity to five) passengers, while the WAVs have capacity for one passenger with a mobility device and four additional ambulatory (Via limits operational capacity to

three) passengers. This difference in capacity is one reason not all vehicles were retrofitted.

The contract also provided the flexibility for Via to supplement service with WAV taxis in the case of higher demand for WAVs than Via could accommodate.[75] This provided a safety net for the MOD provider in case the demand for WAVs was higher than they had planned for. Via did end up dispatching a few WAV taxis for Via to Transit early on before they had enough drivers trained to operate WAVs.

The transit agencies in Puget Sound and Via weighed options of different vehicles and retrofitting approaches. They decided on the Toyota Sienna, and retrofitted three vehicles for rear-entry accessibility for people using large mobility devices. After joining LA Metro in conversations with the FTA on the complex issue of whether or not Buy America regulations applied for the MOD Sandbox pilot, the issue became moot as the Toyota Sienna already had a Buy America waiver. The Toyota Siennas worked well for the first year of the pilot, though they were expensive to retrofit for ADA standards (as many other vehicle choices would have been). The expense of retrofitting vehicles is another reason not all vehicles were made to be wheelchair accessible.

In the Puget Sound region, all transit agencies provide accessible vehicles, and King County Metro provides paratransit for those who qualify for and request it. The King County Metro Paratransit group reviewed the original contract with Via, with a focus on provisions affecting people with physical disabilities. The King County Metro ADA Services Administrator confirmed that the final contract complied with the letter of the law of ADA in the availability of WAVs.

The infrastructure at stops and stations is sometimes owned by the transit agency, and sometimes by the City. Ensuring accessible connectivity for pickups and drop offs involved surveying the stations and working with local jurisdictions in some cases. King County Metro worked with Sound Transit and the City of Seattle to assess existing and potential pickup/dropoff (PUDO) zones at the five relevant stations. Near the Tukwila station, the transit agencies worked with the Tukwila City Fire Department for approval to utilize a fire lane for PUDO space.

A survey of all Via to Transit users collected 1,273 responses, with 63 of the respondents (close to 5 percent) reporting one or more disabilities. The majority of the disabilities reported were related to mobility restrictions such as needing a mobility aid or not being able to use stairs. Some people also reported low vision or hearing. This survey was administered online. Given that over half of WAV Via to Transit rides were requested through the call center instead of through the Via App, there may be a response bias due to not also conducting the survey over the phone. While the survey responses represent only a small sample of the total

ridership of Via to Transit, they indicate that there are many people with disabilities using the service.

At 1.5 miles, the mean trip distance for WAV trips was slightly shorter than the mean for non-WAV trips, and focus groups commented on latent demand for even shorter trips. The Via algorithm disallows trips shorter than a quarter of a mile to avoid replacing walking trips with vehicle trips and to maintain an efficient service for those with longer trip distance requests. However, even one corner without a curb cut or a particularly short pedestrian crossing time for a wide road can leave many people with mobility impairments stranded, even for a short trip.

In terms of reliability, during the first year of the pilot, WAV riders waited an average of 11.9 minutes for their ride to arrive, which is nearly three minutes more than non-WAV riders waited 8.8 minutes for their ride. Estimated wait times provided to WAV riders also varied more from the actual wait time than for riders requesting ambulatory vehicles.

The Via trip data shows actual service provision for WAV riders. While WAV rides do not exclusively overlap with rides for people with physical disabilities, it is the best estimate available for quantitative data analysis. Of the 220,939 completed rides for Via to Transit in the Puget Sound region between April 16, 2019 and February 29, 2020, only 701 (or about 0.32 percent) of completed rides were for users requesting a WAV. Fewer than ten trip requests were for WAVs in the first month of service, but then the number of WAV requests rose steadily over the course of the pilot year, with the exception of a dip during the holiday season in parallel to a dip in all Via to Transit requests in late November and December, 2019.[76]

Figure 3 shows weekly data over the first pilot year, until it ended in the 11th month due to COVID-19 service disruptions.

Figure 3. Weekly Wheelchair Accessible Vehicle Rides Completed in the Puget Sound Region During the Pilot Project

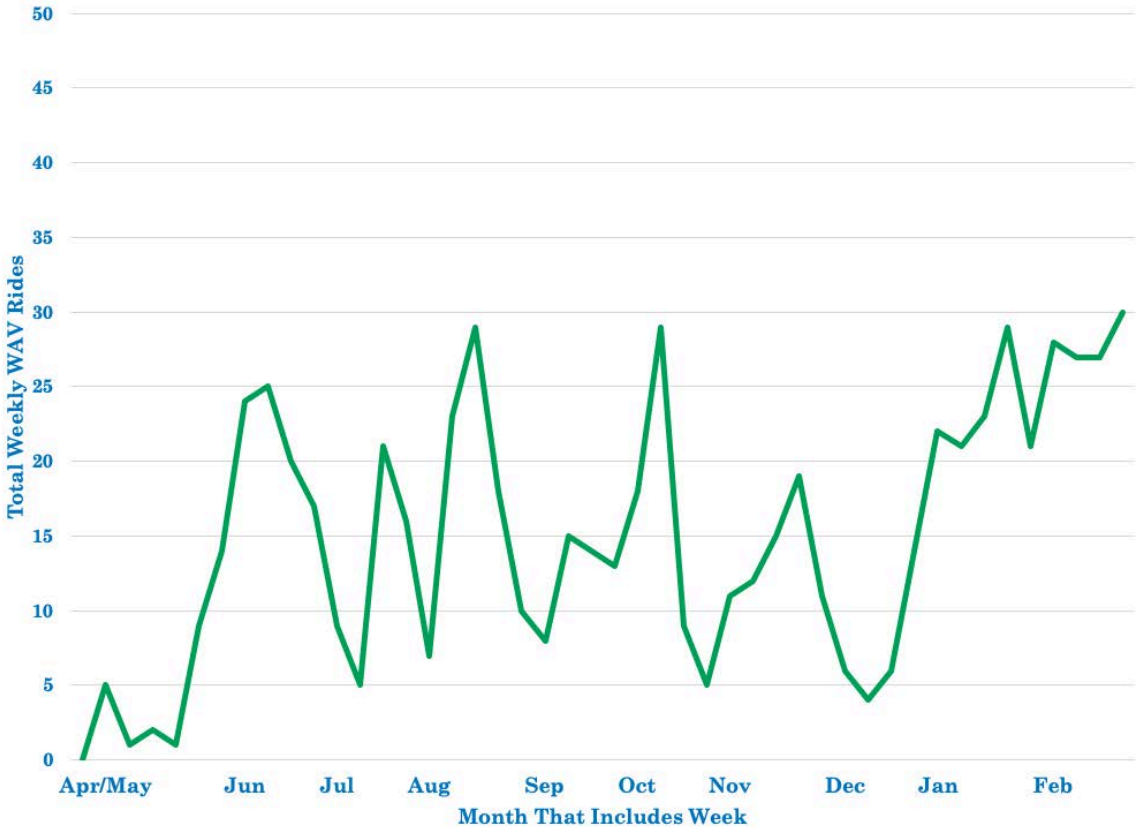


Figure by Mark Hallenbeck
Source: Data from the MOD Pilot

Across days of the week, WAV rides stayed fairly consistent. This trend stands in contrast to the overall trend of Via to Transit rides peaking during weekdays with fewer requests on the weekends. This suggests that while all users may use Via to Transit for commuting, riders who request WAVs may be more likely to use Via to Transit for a variety of trip purposes. Using the data, Via discovered early on that they needed more drivers trained on WAVs and were able to adjust to meet demand.

While the temporal distribution of WAV rides showed a general increase in requests and rides over time, the geographical distribution showed heavier demand in the service area around the Othello station. Out of the total 701 WAV requests, 412 of them occurred in the Othello service area. The presence of low income and public housing in the area, which can correlate with high rates of residents who use mobility devices, may be one reason for this. It could also just be that a few users in that area happened to find many uses for the services, as many of the WAV trips were requested by just a few users who used the service very often. The 701 WAV rides were requested by just 41 unique ORCA IDs (presumably 41 people). Five unique IDs made two thirds of the total WAV requests.[77]

Although Via handled some of the outreach for Via to Transit, King County Metro led the efforts on targeted outreach to the disability community due to their existing networks and established relationships through Access paratransit. They also worked with local groups, including considerable coordination with the non-profit organization Lighthouse for the Blind, who works primarily with blind and deaf communities and is located near the Mount Baker Via to Transit service area.

Representatives from King County Metro and Via worked with Lighthouse for the Blind to coordinate a lunchtime demonstration to show and discuss the vehicles and the Via to Transit service so potential users could learn more about the program and familiarize themselves with the vehicles.

King County Metro also presented to the Metro Access Task Force to inform users about the service and connected with the disability community through email and snail mail letters to reach Access paratransit riders who had taken Access trips within the Via to Transit service areas. Sound Transit briefed their Citizens Accessibility Advisory Committee on the service and asked for feedback.

Feedback from the disability community and riders covered vehicle design, service parameters, driver training, and surrounding infrastructure. Specific needs of different people in different areas with different trip purposes led to suggestions to create exceptions to the minimum quarter-mile trip distance for people carrying heavy things (such as from the Safeway grocery store near Othello), people going to locations such as Lighthouse for the Blind (near Mount Baker) or community centers (Rainier Beach).[78] Feedback from the disability community led to the transit agencies considering changes in year two of the pilot and provided lessons learned for other projects.

The retrofitted vehicles provide comfortable transportation for people using mobility devices or who have trouble walking, but accommodations for people with other physical disabilities like low vision or hearing can still be improved. Two simple changes to the vehicle were identified to keep in mind for future procurement and alteration. The first is that for people with low vision, vehicles are easier to see if they are white. The second change involves marking each vehicle with a unique and easily visible (large size and contrasting color to enhance legibility) identifier to help ensure passenger safety and security. Using license plate numbers to identify vehicles can be difficult for some riders.

While the ADA specifies how and where curb cuts should be designed, the law does not always account for real-world needs. Stakeholders for whom curb cuts are an important element of mobility noted that they were often located further from the Via to Transit PUDO area than they would have preferred. This posed a challenge for the transit agencies, as moving into ADA compliance is often highly prioritized,

but it is difficult to find funding for making changes to an already technically compliant landscape. Further complications include varied jurisdiction of PUDO areas, as while some fall under the purview of a transit agency, others, such as at the Rainier Beach station, are located within City of Seattle right-of-way.

Driver training focused on how to operate WAVs and secure mobility devices. This left something to be desired regarding interaction between drivers and people with both physical and cognitive disabilities, both for WAV and non-WAV operators. The responsibility for driver training fell to Via, and after learning from feedback in the first year of the pilot, they are extending driver sessions to help operators learn about different types of disabilities and tips for communication with all passengers. Expanding the scope of driver preparedness could also involve providing more information to operators in advance of a pickup through the app. For example, if someone has low vision, a service animal, or needs to put a mobility device in the trunk of a vehicle, this could be clearly identified at the time the trip request is placed to help ensure a smooth pick-up experience.

Overall, connecting with the community provided valuable insights, although the program could have benefitted from even more and earlier outreach. Agency staff also noted the potential benefits of being able to reach out to Via to Transit riders who identified as having specific mobility needs or disabilities, but due to privacy considerations, there was no way for the researchers or agencies to obtain contact information for these users in the Via data, or identify users who did not indicate disabilities to Via.

3.3 Performance Measurement

LA Metro, King County Metro, and Sound Transit worked with Via to develop performance measures with adjustable targets as key performance indicators (KPI). The transit agencies also checked with their experts on service for people with disabilities at King County Metro and Access Services at LA Metro to review the performance targets. A selection of the KPIs relating to service for people with disabilities or specific needs are shown in Table 2. While these KPIs and targets may seem redundant, they in fact are necessary to ensure that access for people requesting WAVs or using the call center receive service that meets the standards of service for all users. Since people requesting WAVs used the call center more frequently than other pilot riders overall, measuring call center performance is also important in assessing performance for people with physical disabilities.

Table 2 compares actual performance in both regions at the end of the fourth quarter (Q4) of the pilot for average wait times and percent demand met with the original performance targets. The percent demand met for rides does not include requests that were never accepted by or canceled by the rider, as Via has limited control over rider behavior. It is possible, however, that riders might cancel a trip if they experienced an issue with the service that they were unhappy with, such as a

long wait time. Additional analyses can explore this potential scenario to support the evaluation of the performance measures.

Table 2. LA Metro/King County Metro/Via Initial Key Performance Indicators related to WAV riders

Key Performance Indicator	Actual as of Q4 in Los Angeles	Actual as of Q4 in Puget Sound	Target
Average actual wait time for all requests	9.05 minutes	8.55 minutes	10 minutes or less
Average actual wait time for WAV requests	13.66 minutes	11.91 minutes	10 minutes or less
Average wait time for rides booked through call center	10.18 minutes	9.01 minutes	10 minutes or less
Percent demand met for all requests	95.19%	97.91%	80%
Percent demand met for call center users	100.00%	100.00%	80%
Percent demand met for WAV requests	90.77%	100.00%	80%

Source: Data from the MOD Pilot

The average wait time for WAVs slightly exceeds the 10-minute target in both regions. However, the percent demand met for WAV requests is 100 percent in Puget Sound which both far exceeds the target of 80 percent and, importantly, provides a fully reliable service. In general, the slightly higher wait times in Los Angeles could be related to any number of variables, such as larger service areas. Adjusting the supply of drivers in a zone based on service area and demand is a dynamic task that can be tracked by multiple variables, including average and standard deviation of wait times. Agency staff and the research team have maintained constant monitoring of the variables related to these measures to assess whether other elements of the distributions, such as the maximum wait time, are also suggesting that all users are receiving close to equivalent service.

Although the targets (all targets, not just WAV-related) were designed to be adjustable over time, because Via was almost able to reach all of the initial targets in both regions, they were never adjusted. The need for target flexibility was accommodated from the beginning in part due to the lack of relevant precedent examples for target-setting.[iv]

[iv] The New York City on-demand TNC and WAV performance measures and targets descripted in Section 2.3 had not yet been set or measured, and none of the agencies involved had experience with similar types of service.

4. Recommendations

The MOD Sandbox pilot in Los Angeles and Puget Sound can provide examples for improving the design of MOD services for people with physical disabilities. The recommendations address means of expanding the study, assessment, and access of mobility for all users.

Learn about the variety of types of disabilities riders live with. While this report focuses on certain mobility needs, and in particular riders with physical disabilities, there is a myriad of needs for all users and a plethora of actions that public agencies and private mobility providers can take to create a service that provides as much access and mobility to as many potential users as possible. While the partners of the MOD Sandbox grant in Los Angeles and Seattle addressed some accessibility needs, they also see potential for better serving a larger proportion of the population through iterations of service adjustments and community outreach.

Plan for and discuss accessibility considerations from the beginning with private providers. For LA Metro and the Puget Sound agencies, signing a Term Sheet with Via outlining specific requirements for WAV service set expectations early and allowed the pilots to address WAV-related goals. Private partners need to prepare for and budget for services and vehicles that allow for WAV access and need to ensure they can properly train their driver partners. Access to technology that enables on-demand booking through accessible apps and options for call center booking should also be considered. Knowing the agency goals in the beginning can help ensure targets are met when the service is launched.

Engage the disability community. Engaging the disability community and other stakeholders before, during, and after pilots can help agency staff learn what was done well and what could be improved for future initiatives. Input from the rider community can help direct both capital and operational decision-making, including vehicle procurement decisions and operational and performance considerations.

Learn from experts in the field of transportation for people with disabilities. Not only can the disability community provide helpful feedback, but so can those who are in the business of navigating both the legal and practical considerations of accessible service provision. Civil rights offices and paratransit providers are examples of experts often available to transit agency staff when developing new pilots or services. Both the Los Angeles and Puget Sound transit agencies found connections to these experts useful.

Budget liberally for disability accommodation and ADA compliance. The agencies had to balance ensuring physical access through infrastructure and service elements with staying on budget for a one-year temporary pilot project. Solutions such as plastic bollards instead of steel ones and utilizing existing PUDO zones

helped to keep the pilot affordable in the short run but did not allow for optimal design in all cases.

Set clear performance measures and targets, and report them transparently. Setting measurable targets for service performance for both the disability community and the overall ridership community can help agencies assess the level of service and equivalency of service for all users. Agencies should publicly report the performance results relative to the KPIs and indicate whether the service was able to meet them or not.

Have a backup plan. In both Los Angeles and Puget Sound, the transit agencies and MOD provider agreed to contract with taxi companies with available WAVs to be on-call to provide rides at the beginning of the pilot while the partners were still assessing supply and demand. In Puget Sound, this fallback proved necessary and they were able to serve all requests for passengers and adjust the service parameters moving forward.

Train as many drivers as possible to provide service for all potential users. Ensuring that drivers of WAV vehicles are trained to operate the vehicles and assist people using mobility devices common for WAVs is essential for safety and positive user experience. Extending training for WAV drivers and all drivers in operating various types of vehicles as well as working with people of various physical, sensory, and cognitive disabilities would further improve service for all people, in all types of vehicles. It would also lend additional flexibility, though at increased cost, to service provision by increasing the number of drivers available to drive a WAV when needed, thereby lessening the need to contract fallback services with taxi companies or other entities.

Provide flexibility in the app to indicate needs. Allowing users to indicate specific trip needs beyond wheelchair accessibility could improve service for all users and contribute to greater predictability for drivers. Providing drivers with information about variables such as requests for pick-ups near a curb ramp, presence of service animals, or transport of heavy packages in advance can help them decide where to pick up or drop off passengers while also creating greater transparency between riders and drivers beginning from the moment a trip is requested. Assurance of ethical use of this information and non-bias or discrimination in algorithmic use of the data is paramount to building trust with riders to provide full personal information.

5. Conclusion

The agencies leading these projects are dedicated to providing improved service to riders with disabilities and have in many ways adhered to the intent and letter of laws protecting individuals with disabilities. The pilot projects described in this paper suggest promise for increasing the range of transportation options for all riders, including providing services for riders with disabilities that supplement existing paratransit options. Agencies that desire to develop MOD services outside of a pilot program must fully adhere to the requirements of the ADA and its implementing regulations, but going beyond the letter of the law can provide better access and mobility to all potential users.

While there are many types of disabilities that can have an effect on how users learn about and experience public transit and MOD services, the depth of investigation needed to fully address various options is beyond the scope of this paper and remains important for future research.

Appendix

Fiscal Year 2016 Mobility on Demand (MOD) Sandbox Program Projects

Project Sponsor	Description	Funding
Regional Transportation Authority of Pima County, Arizona	The Adaptive Mobility with Reliability and Efficiency project, integrating fixed route, subscription based ride-sharing and social carpooling services into an existing data platform to provide affordable, convenient and flexible service. The project augments transit by addressing first mile/ last mile issues and congestion mitigation by incorporating shared ride-on-demand services, integrated open payment systems and advanced traveler information systems.	$669,158
Valley Metro Rail, Inc., Phoenix	A smart phone mobility platform that integrates mobile ticketing and multimodal trip planning. The network will include a range of mobility providers, including ride-hailing, bike sharing, and car-sharing companies, allowing all levels of income, age and people with disabilities to have access to an integrated, connected multimodal transportation system.	$1,001,000
City of Palo Alto, California	The Bay Area Fair Value Commuting Demonstration project, which aims to reduce single-occupant vehicle driving from 75% to 50% in the Bay Area. The project includes commuter trip reduction software, a mobility aggregation multimodal trip planning app, workplace parking rebates and analytics to compare commutes.	$1,085,000
Los Angeles County Metropolitan Transportation Authority	A two-region mobility on demand partnership with the car-sharing company, Lyft*, in Los Angeles and Puget Sound. The project will explore the viability of first/last mile solutions for trips originating and ending at select transit stops. Customers can use the Lyft* app or call a dispatcher phone number, providing equity to lower income individuals. (*Partnership changed from Lyft to Via since announcement.)	$1,350,000
San Francisco Bay Area Rapid Transit	An integrated carpool to transit program that will help users find carpool matches as well as match them to their transit destinations. The project will provide a seamless way to reserve and pay for in-demand parking spaces at BART stations, allow preferential parking for carpoolers while increasing transit ridership by improving access to BART stations. The software will include ways to identify drivers with wheelchair-accessible vehicles.	$358,000

Project Sponsor	Description	Funding
Pinellas Suncoast Transit Authority, Florida	For the Paratransit Mobility on Demand Demonstration, a set of partnerships with a taxi company, a paratransit service and a car-sharing company to develop a model to provide more cost-effective on-demand door-to-door paratransit service. The project will feature a central dispatch software that provides users with a selection of transportation service providers based on an estimated time of pickup, available payment types, and physical limitations.	$500,000
Chicago Transit Authority	A project that will incorporate the local bike sharing company, Divvy, a 580-station bike share service, into CTA's existing transit trip planning app so users can identify the availability of bikes or docking stations near their transit stops, and pay for bike rentals.	$400,000
Tri-County Metropolitan Transportation District, Oregon	An Open Trip Planner Share Use Mobility project that will create a platform integrating transit and shared-use mobility options. TriMet will build on its existing trip planning app to incorporate shared use mobility options and more sophisticated functionality and interfaces, including data sharing for shared-use mobility providers. By integrating data, the project will allow users to plan trips that address first/last mile issues while traveling by transit.	$678,000
Dallas Area Rapid Transit	A project that integrates ride-sharing services into its GoPass ticketing app to solve first and last mile issues. This project will combine traveler applications to create an integrated, multimodal application that leverages ride-sharing services. The project will improve ease of access to DART stations, particularly in non-walkable areas not well served by transit.	$1,204,000
Vermont Agency of Transportation	A statewide transit trip planner that will enable flex-route, hail-a-ride, and other non-fixed-route services to be incorporated in mobility apps. The online trip planner for both fixed and flexible transit services particularly benefits non-traditional rural transit system users, allowing universal access to transit information, including to people with disabilities.	$480,000
Pierce County Public Transportation Benefit Area Corporation	The Limited Access Connections project, an initiative connecting Pierce Transit local service, Sound Transit/Sounder regional service, and local ride-share companies in order to increase regional transit use. By providing first/last mile service in and between traditional zones, guaranteed rides home, and rides to park-and-ride lots, the project will extend service hours and provide access to transit for riders who have limited transit options.	$205,922

Source: Federal Transit Administration

Source: Final Contracts between LA Metro and Via for Metro's MOD Partnership with Via and King County Metro and Via for Via to Transit

Endnotes

[1] Centers for Disease Control and Prevention, "Disability Impacts All of Us," 2019.
[2] CDC 2019; National Center for Mobility Management, "The Role of Transportation in Addressing Social Isolation in Older Adults," 2002.
[3] CDC 2019.
[4] Americans With Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 328 (1990).
[5] Federal Transit Administration, Competitive Funding Opportunity: Mobility On Demand (MOD) Sandbox Program, FTA-2016-006-TRI, May 3, 2016
[6] FTA 2016; Anthony Foxx, Shared Mobility "Dear Colleague" Letter, Office of the Secretary of Transportation, December 5, 2016.
[7] Americans With Disabilities Act of 1990; Section 504 of the Rehabilitation Act of 1973, Pub. L. No. 93-112, 87 Stat. 394 (Sept. 26, 1973).
[8] United States Access Board," ADA Accessibility Guidelines (ADAAG)," as amended through September 2002.
[9] See: 49 CFR Parts 27, 37, 38, and 39.
[10] See: 49 CFR 37.23.
[11] See: FTA Circular 4710.1, "Americans With Disabilities Act Guidance," 11-04-15.
[12] See: 49 CFR Part 37, Subpart G.
[13] ibid; Ryan Honick, "Using Rideshare Services Isn't Easy When You Have a Service Animal. That Needs to Change." *Rooted in Rights,* January 16, 2019; Liz Kreutz, "San Francisco woman with disability who says Lyft drivers repeatedly cancel her rides is calling for change," *ABC7 News,* August 11, 2019. ; Michael Finney and Renee Koury, "Uber driver sees passenger in wheelchair, takes off," *ABC7 News,* May 1, 2019.; National Federation of the Blind, "Uber and Lyft Still Denying Rides to Those with Service Animals," May 24, 2019.
[14] Americans With Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 328 (1990).
[15] See: 49 CFR Part 38, Subpart B.
[16] ibid
[17] See: 49 CFR 38.23(d).
[18] ibid.
[19] See: 49 CFR 37.173 (1991).
[20] See: FTA Circular 4710.1, "Americans With Disabilities Act Guidance," Section 4.2, 11-04-15.
[21] See: FTA Circular 4710.1, "Americans With Disabilities Act Guidance," Section 7.6.1, 11-04-15.
[22] See: 49 CFR 37.3.
[23] See: CFR Part 37, Subpart C.
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